

University of Wollongong

## Research Online

---

Faculty of Science, Medicine and Health -  
Papers: part A

Faculty of Science, Medicine and Health

---

1-1-2013

### Students coached for an admission test perform less well throughout a medical course

B Griffin

*Macquarie University*, [barbara.griffin@mq.edu.au](mailto:barbara.griffin@mq.edu.au)

N D. Yeomans

*University of Western Sydney*

I G. Wilson

*University of Wollongong*, [ianwil@uow.edu.au](mailto:ianwil@uow.edu.au)

Follow this and additional works at: <https://ro.uow.edu.au/smhpapers>



Part of the [Medicine and Health Sciences Commons](#), and the [Social and Behavioral Sciences Commons](#)

---

#### Recommended Citation

Griffin, B; Yeomans, N D.; and Wilson, I G., "Students coached for an admission test perform less well throughout a medical course" (2013). *Faculty of Science, Medicine and Health - Papers: part A*. 1093. <https://ro.uow.edu.au/smhpapers/1093>

Research Online is the open access institutional repository for the University of Wollongong. For further information contact the UOW Library: [research-pubs@uow.edu.au](mailto:research-pubs@uow.edu.au)

---

## Students coached for an admission test perform less well throughout a medical course

### Abstract

**Background:** Undertaking commercial coaching to improve one's chance of selection into medical school is widespread. Although its effect on selection test performance appears to be relatively minimal, its impact on the predictive validity of the tests is unknown.

**Aims** To examine whether commercial coaching for the Undergraduate Medical and Health Sciences Admissions Test (UMAT) changes its ability to predict the subsequent academic performance of medical students.

**Methods:** The first two cohorts to enrol in a new Australian medical school provided information at the time of their selection interview about whether or not they had undertaken a commercial coaching course to help prepare for the UMAT. Final academic grades for each year of the degree and overall grade point average (GPA) of coached students were compared with those of non-coached students. Moderated regression analyses examined differences in the relationship between UMAT scores and examination results while controlling for entry UMAT scores and past academic performance.

**Results:** Coached students had a lower GPA than those who were not coached. In cohort 1, coached students performed more poorly than non-coached students in every year of their degree. This effect, while similar, was not statistically significant in cohort 2.

**Conclusions:** Differences in selection process and learning context between the two cohorts may explain why coaching was only significantly related to the performance of one cohort. Further research is required to ascertain if coached students develop a learning style that hinders ongoing acquisition of knowledge, which might have serious implications for job performance after graduation.

### Keywords

well, throughout, medical, course, perform, less, test, students, admission, coached

### Disciplines

Medicine and Health Sciences | Social and Behavioral Sciences

### Publication Details

Griffin, B., Yeomans, N. D. & Wilson, I. G. (2013). Students coached for an admission test perform less well throughout a medical course. *Internal Medicine Journal*, 43 (8), 927-932.

## **Students coached for an admission test perform less well throughout a medical course**

Barbara Griffin, BPsychology (Hons.), PhD. Dept of Psychology, Macquarie University

Neville D Yeomans, MD, DSc (hon. causa), FRACP, FACG, AGAF. School of Medicine, University of Western Sydney and Austin Health.

Ian G Wilson, MBBS, MAssess&Eval, PhD, FRACGP. Graduate School of Medicine, University of Wollongong

### **Address for editorial correspondence:**

A/Prof Barbara Griffin, PhD, Department of Psychology, Macquarie University, NSW 2109

Email: barbara.griffin@mq.edu.au

Telephone: 02 9850 9012

### **Abstract**

**Background:** Undertaking commercial coaching to improve one's chance of selection into medical school is widespread. Although its effect on selection test performance appears to be relatively minimal, its impact on the predictive validity of the tests is unknown.

**Aims:** To examine whether commercial coaching for the Undergraduate Medical and Health Sciences Admissions Test (UMAT) changes its ability to predict the subsequent academic performance of medical students.

**Methods:** The first two cohorts to enrol in a new Australian medical school provided information at the time of their selection interview about whether or not they had undertaken a commercial coaching course to help prepare for the UMAT. Final academic grades for each year of the degree and overall grade point average (GPA) of coached students were compared with those of un-coached students. Moderated regression analyses examined differences in the relationship between UMAT scores and examination results while controlling for entry UMAT scores and past academic performance.

**Results:** Coached students had a lower GPA than those who were not coached. In Cohort 1, coached students performed more poorly than un-coached students in every year of their degree. This effect, while similar, was not statistically significant in Cohort 2.

**Conclusions:** Differences in selection process and learning context between the two cohorts may explain why coaching was only significantly related to the performance of one cohort. Further research is required to ascertain if coached students develop a learning style that hinders ongoing acquisition of knowledge, which might have serious implications for job performance after graduation.

**Keywords:** UMAT coaching, medical students, Student selection,

The question of whether commercial coaching subverts some of the aims of medical school selection processes has been of concern to universities around the globe.<sup>1</sup> Although undertaking such coaching might be an indicator of an applicant's strong motivation, two main issues underlie the concern. The first is that if coaching is successful in improving performance on selection tests, then it disadvantages those who (for financial or access reasons) cannot

undertake coaching.<sup>2</sup> The second problem is that coaching may undermine the validity of the selection tests.<sup>3</sup> In other words, although coaching might help students improve their ability to answer test items, it is most unlikely to improve their underlying ability on the construct being assessed by the test.<sup>4</sup> This carries the risk of selecting coached students who are actually not as capable as non-coached students to cope with the academic demands of a medical course or with the continuous learning and decision making required of medical practitioners.

In the context of increasing uptake of commercial coaching by applicants to Australian medical schools,<sup>5</sup> the current study focuses on coaching for the Undergraduate Medical and Health Sciences Admissions Test (UMAT). The UMAT is used across Australia and New Zealand to select students into undergraduate medical degrees. It consists of multiple choice items that assess problem solving skills, understanding people, and non-verbal logical reasoning.<sup>6</sup> There is evidence that at least half the applicant pool undertake commercial coaching prior to sitting the test,<sup>2, 7</sup> with recent research suggesting that coaching has a small positive influence on performance, but only on the section assessing non-verbal logical reasoning.<sup>7</sup> This study is the first to investigate whether the subsequent academic outcomes of successful applicants who attended UMAT coaching are different from those who did not attend coaching.

When an ability or aptitude test does not require any specific pre-requisite knowledge in order to perform well, as is the case with the UMAT,<sup>8</sup> commercial coaching is characterised by “intensive, short-term, massed drill on items similar to those in the test”.<sup>3 p. 1092</sup> It is argued that this kind of coaching reduces the *g* loadings of the tests, where *g* refers to a general intelligence factor that emerges from any diverse set of cognitive tests and which predicts educational and occupational success more powerfully than any other psychological construct.<sup>9</sup> Instead they become a measure of reproductive or rule-applying behaviour, with a consequent lowering of predictive validity.<sup>10</sup>

Evidence regarding the predictive validity of the UMAT is mixed. Although Edwards, Friedman, Canny, and Story<sup>11</sup> provide data suggesting that the UMAT is a significant predictor of academic results in the early years of medical school, two studies<sup>12, 13</sup> concluded that UMAT scores have little relationship with academic performance during a medical degree. In addition to the downward bias on validity coefficients that occurs when there is considerable restriction of range<sup>14</sup> as found in these studies<sup>15</sup> (i.e. the applicants are from within a tight band of the highest achieving high school students), coaching could be acting as a moderator of validity. First, if the UMAT results of coached students are more a measure of “test-wiseness”<sup>4</sup> than of cognitive ability, then their scores may *over-predict* academic performance (i.e., their examination results will be lower than expected). Second, there may be *differential validity*, whereby the strength and direction of the correlation between UMAT scores and academic performance may be different for coached and non-coached students.

## **Methods**

### *Participants*

The study population comprised the first two cohorts of students in the new five year undergraduate medical course at the University of Western Sydney, who had completed a voluntary questionnaire immediately after they completed the final step (a multi-station interview) in their application process for admission. Cohort 1 commenced their studies in 2007, graduating at the end of 2011. Cohort 2 commenced their degree in 2008, graduating at the end of 2012.

### *Measures*

*University Admissions Index (UAI)* (now replaced by the very similar Australian Tertiary Admission Rank) represents performance in the Higher School Certificate - the final academic assessment at the end of secondary school. It is expressed as a percentile ranking.

*UMAT results.* Separate scores are awarded for each of the three UMAT Sections. The current UMAT has 48, 44, and 42 items in Sections 1, 2 and 3 respectively and marks are scaled by the test publisher (Australian Council for Educational Research). Section 1 assesses problem solving, Section 2 understanding people, and Section 3 non-verbal reasoning.<sup>8</sup>

*Commercial coaching* was assessed using the measure from Griffin et al.<sup>2</sup> (see also Jones & Vanyur<sup>16</sup>), which asked students to indicate whether or not they had attended a coaching course and if so, which one. Those involved in making the final selection decisions were unaware whether the applicants had received coaching.

*Academic performance.* Results from all five years of the medical course were available, with an average score calculated for each year where grades for more than one final subject were awarded. Years 3, 4 and 5 had a greater clinical focus. A grade point average score (GPA; out of 7) was calculated for each participant based on their overall studies.

#### *Statistical Methods*

Data are shown as means and standard errors. Statistical significance of differences between means were tested with independent t-tests for two group comparisons, and 2-way Analysis of Variance (ANOVA) for comparisons of coached versus non-coached by cohort. Multiple regression analyses were then conducted to examine the effect of coaching after controlling for UAI and the three UMAT scores using the full sample of participants (data pooled across cohorts). Finally, a series of hierarchical regression analyses were conducted to ascertain whether the relationship between UMAT scores and academic results was the same for coached and uncoached students. Interaction terms were created by multiplying the coaching variable by the standardised UMAT scores. Because small sample sizes reduce the likelihood of finding significant interactions,<sup>17</sup> we also combined the cohorts for these analyses.

The research was approved by the institution's Human Ethics Committee. It was performed without external funding.

## **Results**

### *Characteristics of the study populations*

Information about whether or not coaching courses had been attended was obtained from 83 students in Cohort 1. Of this group, 52.4% had attended commercial coaching, 52.2% were female, and 59.4% came from the local area of Greater Western Sydney (surrounding the medical school). From the second cohort, 93 students participated of whom 53.8% attended commercial coaching, 54.1% were female, and 70% from the local area. The response rates for the two cohorts were 77.6% and 78.2% respectively (note that the full cohort included international students and those who transferred from other universities so the response rate from eligible students (i.e. those who participated in the standard admissions processes for commencing Australian citizens), would have been higher.

### *Differences between coached and not coached students at enrolment*

The overall mean scores and standard errors for the selection tests (UMAT and UAI) are provided in Table 1. There were no significant differences in UMAT scores between coached and un-coached in either cohort, but the coached students had a significantly higher mean UAI (97.79 vs. 96.42;  $t = 2.25$ ,  $p = .027$ ) in Cohort 1 which was similar (but not significant) in Cohort 2 (98.00 vs. 96.94;  $t = 1.95$ ,  $p = .054$ ).

### *Differences between coached and not coached students in academic results*

As illustrated in Figure 1, coached students in Cohort 1 had significantly lower examination grades than un-coached students across every year. None of the differences in academic results reached significance for Cohort 2 (although there was a trend for slightly better performance by the coached students in Years 1 and 2 and slightly worse performance in the clinical Years 3 to 5).

Results from the 2 x 2 ANOVA (illustrated in Figure 2) showed a main effect for coaching in reducing GPA ( $F = 9.11, p = .003$ ). While this effect appeared to be stronger for Cohort 1, the interaction between coaching and cohort was not significant ( $p = .186$ ). Neither was there a significant effect for cohort ( $p = .62$ ).

Of all the participants in both cohorts, 15 students had failed at least one year of their studies and either withdrawn from the course or had to repeat. Of these, 60% had been coached and 40% not coached.

#### *Differences in academic results, controlling for UAI and UMAT scores.*

As can be seen in Table 2, when GPA was the dependent variable and after controlling for UAI and UMAT scores, coached students had a lower GPA (despite their higher UAI on entry). We note that UAI and UMAT Section 1 were significantly and positively related to GPA and UMAT 3 actually had a negative, albeit non significant, relationship with GPA when all other variables were controlled for. Coaching was also a negative predictor of final examination results after controlling for selection test scores and when cohorts were combined, but this only reached significance in Years 3 and 4 (Year 5:  $p = .058$ ).

#### *Differential validity*

There were no significant interactions between UMAT scores and coaching in predicting GPA or yearly examination grades.

### **Discussion**

This study investigated whether the predictive validity of the UMAT is affected by students having attended coaching in an effort to maximise their chance of selection. While the UMAT appeared to have a similar relationship with academic results for the coached and non coached students, the results indicated that coached students performed more poorly than non coached students in examinations conducted throughout medical school. This



suggests that high UMAT scores may not reflect high ability for those who obtain a high score due to coaching <sup>4</sup> and therefore over-predict future academic performance.

However, while the negative relationship between coaching and academic grades was seen clearly in the first cohort of students to go through a new Australian medical school, there was no significant evidence in data from the second cohort. The question therefore remains as to why coaching had an ongoing and clear effect in the first but not the second cohort of students.

There were two clear differences between the groups that might account for the results. Firstly, the weighting given to the UMAT scores for making selection decisions was different. All three UMAT scores were equally weighted for Cohort 1, but as a result of research <sup>2</sup> showing that coaching may improve UMAT Section 3 scores, this section was reduced to half weighting for the selection of Cohort 2 students. As a result, those whose score was particularly distorted by coaching were less likely to have been selected in Cohort 2.

The second difference relates to the learning environment and its match with learning style. Dweck <sup>18</sup> argues that individuals are motivated either by learning goals or performance goals. Those high in learning goal orientation are generally more adaptive to novel or challenging learning situations because they are more focused on learning, improving their abilities and mastering the task at hand. Those with high performance goal orientation are concerned with achieving positive evaluations and avoiding negative evaluations of their performance <sup>18</sup> so are more likely to focus narrowly on exam content than on the broader learning. We suggest that those who engage in coaching are more likely to have, or develop, a performance goal orientation.

In Australian medical schools there is anecdotal evidence that students in senior years to 'coach' those in more junior years, by providing examples of exam questions, answers to problem-based learning cases, and assistance with Objective Structured Clinical Examinations

preparation. However Cohort 1, as the first intake into a new medical school, were studying in a novel, 'unproven' context with no support or advice available from experienced students in more senior years. Therefore, those with a learning goal orientation were likely to have performed better. In contrast, those in Cohort 2 were provided with a form of 'coaching' from Cohort 1 students reducing the differences between those with learning and performance goal orientations. In other words, coached students with a performance goal orientation may have struggled in Cohort 1's learning environment but not in Cohort 2's learning environment. The concern would be whether they would then go on to struggle as a qualified practitioner required to undertaking ongoing professional development in an environment that is likely to better fit those with a learning goal orientation. Further research is needed on the learning styles that best predict those who will continue with the life-long and self-directed learning required by those in the medical profession.

Another possible explanation for the differences in the effects of pre-admission coaching on subsequent exam performance in the two cohorts may relate to other differences between founder and subsequent cohorts in a tertiary course that emphasises active learning. Published data comparing founder and subsequent cohorts in other settings appears to be lacking. However, it is possible to hypothesize that founder students may be more adventurous and/or risk taking, since they are embarking on an untried course of unknown reputation. Anecdotally, the staff of the school felt that they recognised some subjective differences in learning styles and application between the first two cohorts, in at least the first two years of their course.

Some limitations of this study should be acknowledged. Coaching is a difficult area to study because in "real-world" contexts there is no assignment to treatment and control conditions – indeed it would be unethical to do so.<sup>19</sup> Therefore coached and uncoached candidates may differ in motivation and on other key variables. However, in our study the

primary outcome of interest was not the test for which coaching was undertaken and this, together with controlling for admission scores, likely reduced the effect of such differences. Likewise, we were not able to control for the varying types of coaching that individuals in the coached group may have received. Nevertheless, our measure was the same as used in prior studies,<sup>2, 16, 19</sup> with evidence indicating that commercial coaching courses for medical selection use similar methods.<sup>19</sup> Although there was no way of determining if students were honestly admitting to having been coached, the incidence of reported coaching has been similar across seven years of data collection with both medical students and high school students.<sup>7</sup> There is also a potential limitation regarding the generalizability of our results given that participants were undergraduate medical students and the coached test was the UMAT, a measure of cognitive ability that requires no prior learning. Further research will be needed to replicate the results in other contexts.

Jones and Vanyur<sup>16</sup> conducted an early study comparing the academic outcomes between medical students who had undertaken coaching on selection tests with those who had not. Although the results were non significant, that study focused on the MCAT, which requires a level of existing knowledge to perform well. Since then, selection tests that require no prior learning have been introduced in many countries across the globe and a flourishing coaching industry has developed in response.<sup>2, 19</sup> Ours is the first study to have addressed the ongoing effects of coaching in this context.

## References

1. Lievens F, Sackett PR. The validity of interpersonal skills assessment via situational judgment tests for predicting academic success and job performance. *J Appl Psychol* 2012; 97:460-468.
2. Griffin B, Harding DW, Wilson IG, Yeomans ND. Does practice make perfect? The effect of coaching and retesting on selection tests used for admission to an Australian medical school. *Med J Aust* 2008; 189:270-273.
3. Anastasi A. Coaching, test sophistication, and developed abilities. *Am Psychol* 1981; 36:1086-1093.
4. Hausknecht JP, Halpert JA, Di Paolo NT, Moriarty Gerrard MO. Retesting in selection: A meta-analysis of coaching and practice effects for tests of cognitive ability. *J Appl Psychol* 2007; 92:373-385.
5. Wong CXJ, Roberts-Thomson RL. Does practice make perfect? The effect of coaching and retesting on selection tests used for admission to an Australian medical school [Letter]. *Med J Aust* 2009; 190:101-102.
6. Australian Council for Educational Research (ACER). About UMAT: Structure and Content <http://umat.acer.edu.au/about-umat/structure-and-content/> (accessed Jan 2013)
7. Griffin B, Carless S, Wilson I. The effect of commercial coaching on selection test performance. *Med Teach* 2013;35:295-300.
8. Mercer A, Chiavaroli N. A review of the underlying constructs and an analysis of the content of the Undergraduate Medicine and Health Sciences Admission Test. Paper presented at: UMAT Consortium, Australian Council for Educational Research; 2006; Melbourne, Australia.
9. Carroll J. Human cognitive abilities: A survey of the factor-analytic literature. Cambridge: Cambridge University Press; 1993.

10. Nijenhuis JT, Voskuijl OF, Schijve NB. Practice and Coaching on IQ Tests: Quite a Lot of g.  
*Int J Select Assess* 2001; 9:302-308.
11. Edwards D, Friedman T, Canny B, Story M. The predictive validity of undergraduate admissions variables for medical school selection. Manuscript submitted for review.
12. Poole P, Shulruf B, Rudland J, Wilkinson T. Comparison of UMAT scores and GPA in prediction of performance in medical school: a national study. *Med Educ* 2012; 46:163-71.
13. Wilkinson DZ, Zhang J, Parker M. Predictive validity of the Undergraduate Medicine and Health Sciences Admission Test for medical students' academic performance. *Med J Aust* 2011; 194:341-344.
14. Hunter, JE, Schmidt FL, Huy L. Implications of Direct and Indirect Range Restriction for Meta-Analysis Methods and Findings. *J Appl Psychol* 2006; 91:594-612.
15. Griffin B. Predictive validity of the UMAT for medical students' academic performance [Letter]. *Med J Aust* 2011; 195: 102.
16. Jones RF, Vanyur S. A comparison of the predictive validity of the MCAT for coached and uncoached students. *J Med Educ* 1986; 61:335-338.
17. Armitage P, Berry G. Statistical methods in medical research. 2nd ed. Oxford: Blackwell scientific publications; 1987. p.179-185.
18. Dweck CS. Motivational processes affecting learning. *Am Psychol* 1986; 41:1040-1048.
19. Lievens F, Buyse T, Sackett PR, Connelly BS. The effects of coaching on situational judgment tests in high-stakes selection. *Int J Select Assess* 2012; 20:272-282.



**Table 1. Selection test score means and standard errors**

	<i>Cohort 1</i>		<i>Cohort 2</i>	
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
UMAT 1	60.11	.86	59.80	.63
UMAT 2	58.41	.77	56.90	.71
UMAT 3	63.16	.92	61.72	.82
UAI	97.17	.31	97.49	.28

**Table 2. Multiple regression analyses on full sample, with GPA and final year results as the dependent variables**

	GPA		Year 1		Year 2		Year 3		Year 4		Year 5	
	$\beta$	$t$	$\beta$	$t$	$\beta$	$t$	$\beta$	$t$	$\beta$	$t$	$\beta$	$t$
UAI	.28	3.56**	.29	3.71**	.22	2.77*	.23	2.93**	.25	2.99**	.12	1.33
UMAT 1	.20	2.58*	.29	3.82**	.28	3.66**	.17	2.23*	.14	1.69	.08	.96
UMAT 2	.13	1.60	.05	.57	.10	1.23	.22	2.58*	.21	2.40*	-.02	-.25
UMAT 3	-.13	-1.62	-.11	-1.39	-.11	-1.21	-.16	-1.94	-.09	-1.05	.18	-1.99*
Coaching	-.25	-3.31**	-.11	-1.38	-.11	-1.47	-.17	-2.22*	-.16	-2.02*	-.16	-1.91
$F$	7.44**		6.80**		5.70**		6.64**		4.85**		2.02	
$R^2$	.21		.19		.16		.19		.15		.07	

*Note.* \*\* $p < .01$ ; \* $p < .05$



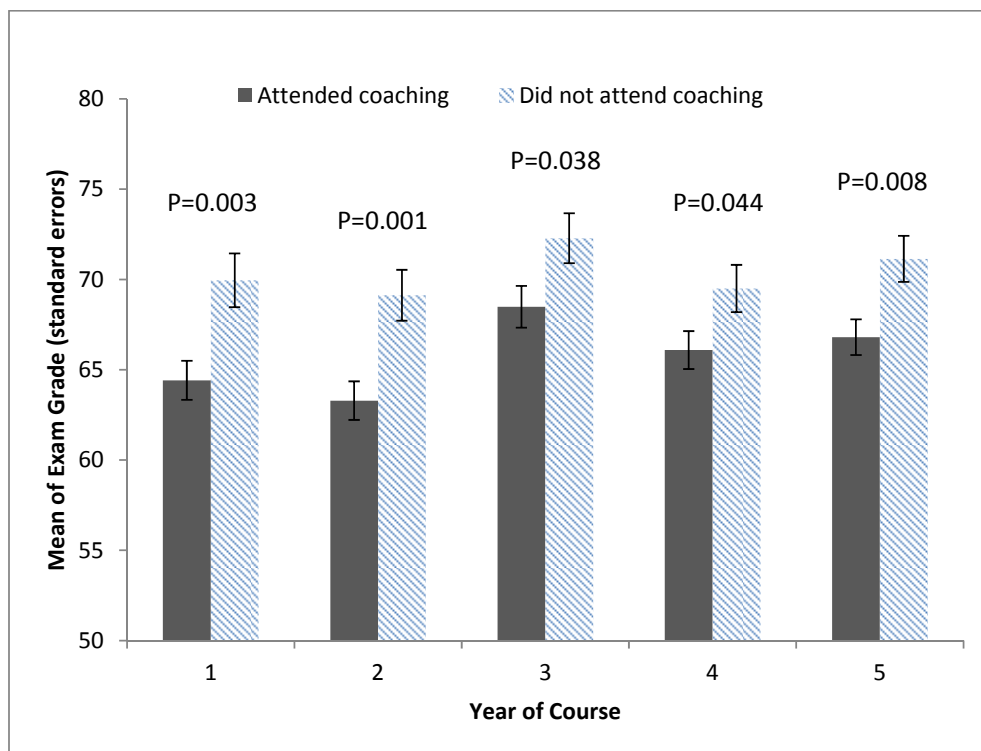


Figure 1. UWS Medical Course – Cohort 1. Mean grades per year in those who did and did not attend a coaching course aimed at improving their likelihood of admission.

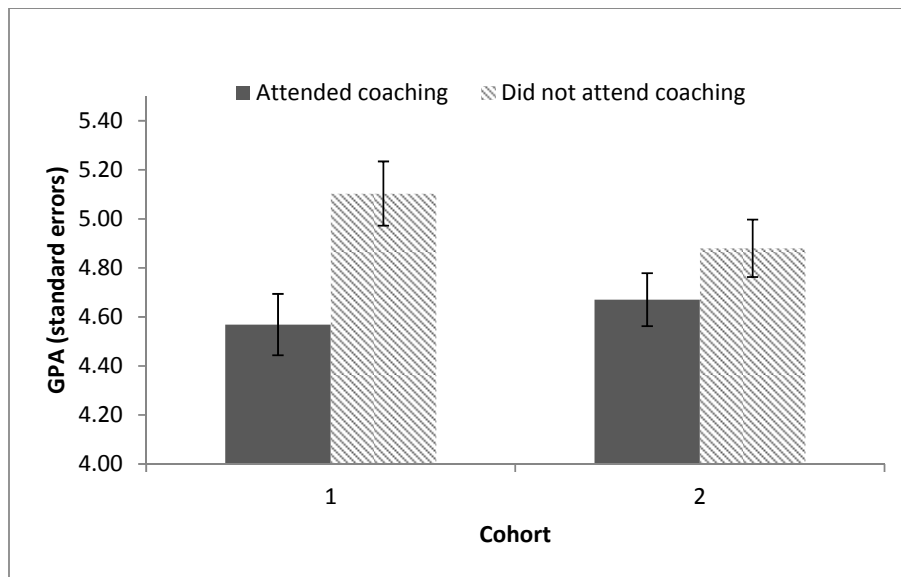


Figure 2. Grade point averages (GPA) for the full 5 years of the course of those coached or not prior to admission. 2-way ANOVA for coached vs. non-coached, with Cohorts 1 and 2 combined:  $F=3.41$ ,  $P=0.019$ .